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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,011	07/16/2003	Jurgen Ramm	H60-080 US	9108

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EXAMINER	
BREWSTER, WILLIAM M	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/621,011	RAMM, JURGEN	
	Examiner	Art Unit	
	William M. Brewster	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-31* is/are rejected.

7)☒ Claim(s) *2* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-7, 10, 17, 19, 28, 30, 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Barbee Jr., et al., U.S. Patent No. 5,486,277.

Barbee anticipates a method for manufacturing a structural element comprising: in fig. 3, providing a first part with a surface substantially of copper 26, and adapted to be mechanically and electrically connected to a metal surface of a second part, wherein the surface of the first part resides at the endpoint of the line at the top of the figure labeled 26, and wherein this first piece is mechanically connected (where the figure reveals no separation line between the two parts) to the second part residing at the endpoint of the line at the bottom of the figure labeled 28; depositing a hard layer on said surface of said first part, said hard layer consisting of at least one of the following materials: a) SiOx with 1 .5 $\leq x \leq 2$, b) TaSiN; c) TiN; d) AlO; e) TiSiN; f) TaN; g) SiN; h) WSiN; i) ReO; j) PdO; k) ZrO; l) YO; m) ZrN; n) NbN; o) VN; p) CuN;
whereby said hard layer is amorphous under X-rays: amorphous SiO_2 27, col. 9, line 56 - col. 10, line 18;

limitations from claims 3-7: further comprising the step of depositing said hard layer so that said hard layer is stable to at least 80° C - 300° C: 500° C, col. 8, line 49 - col. 9, line 18;

limitations from claim 10: wherein at least one of said first part or said second part is a wire: wherein 26, the first part, is a thin copper structure conducting electrons: a wire;

limitations from claims 17, 19: wherein said material of said hard layer comprises oxygen in a substoichiometric ratio, wherein said material comprises SiO_2: SiO_2, col. 9, line 56 - col. 10, line 18;

limitations from claims 28, 30, 31: further comprising depositing said hard layer as an electrically insulating layer; further comprising the step of selecting said hard layer to be of one of said materials; wherein said layer is a functional layer of a function of said element: dielectric of capacitor of oxide SiO_2.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 8, 10, 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Joshi, U.S. Patent No. 6,335,569 B1.

Joshi anticipates a method for manufacturing a structural element comprising: in fig. 8, providing a first part with a surface substantially of copper 102, and adapted to be mechanically and electrically connected to a metal surface of a second part, wherein the surface of the first part is at the top of structure 102, and wherein this first piece is mechanically connected (where the figure reveals no separation line between the two parts) to the second part residing at the bottom of the structure 102; wherein the first part is a wire 102, depositing a hard layer on said surface of said first part, said hard layer consisting of at least one of the following materials: a) SiOx with $1.5 \leq x \leq 2$, b) TaSiN; c) TiN; d) AlO; e) TiSiN; f) TaN; 9) SiN; h) WSiN; i) ReO; j) PdO; k) ZrO; l) YO; m) ZrN ; n) NbN; o) VN; p) CuN; whereby said hard layer is amorphous under X-rays: wherein the hard layer 90 is amorphous Si_3N_4 or $Ta_xSi_yN_z$; further comprising the steps of providing a second part 104 with a surface of a metal, wherein said surface of

second part substantially consists of copper, and connecting said first part with said second part by bonding said surface of said first part, upper surface of 102 to said surface of said second part, lower surface of 104, col. 11, lines 6-55.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joshi as applied to claims 1, 2, 10, 27 above, and further in view of Farrar, U.S. Publication No. 2002/0127845 A1.

Joshi does not specify forming the upper part of gold and aluminum, but Farrar does. Farrar teaches in figs. 2A, 2B, forming a lower conductive layer 215, bonded to an second layer 227 the surface of said second pad consists of gold and of aluminum, pp. 3-4, ¶ 35. Farrar gives motivation in p. 1, ¶ 5. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Farrar's process with Joshi's invention would have been beneficial because the structure has improved interconnect conductivity with lower capacitance.

Joshi does not specify the composition of the Ta, Si, and N in his amorphous layer leaving this dimension to be optimized by the practitioner.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentablility to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 11, 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Asakawa et al., U.S. Patent No. 5,820,980.

Barbee does not specify forming the hard layer by sputtering, but Asakawa does. Asakawa teaches comprising the step of depositing said hard layer by a vacuum deposition process, wherein said hard layer consists of SiOx and is deposited by

sputtering, also comprising the step of depositing said Si by sputtering: forming a substrate and depositing a a-SiO_x on col. 3, lines 28-38. Asakawa gives motivation in col. 1, line 65 - col. 2, line 5. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Asakawa's process with Barbee's invention would have been beneficial because the film has good wear resistance.

Claims 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Parkhe, U.S. Patent No. 6,033,482.

Barbee does not specify purging the part with hydrogen plasma, but Parkhe does. Parkhe cleans with a plasma that purges parts with either hydrogen and nitrogen-hydrogen gas. Parkhe gives motivation in col. 1, lines 39-49. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Parkhe's process with Barbee's invention would have been beneficial because it cleans the wafer without forming liquid waste as would a HF cleaning.

Claims 18, 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Blumenfeld, U.S. Patent No. 3,615,942.

Barbee does not specify forming a hard layer by thermical treatment in ambient atmosphere, but Blumenfeld does. Blumenfeld specifies forming a substrate wherein depositing said hard layer comprises depositing a layer of Si and treating said layer of Si by a thermical treatment in at least one of a nitrogen plasma and in ambient atmosphere: an ambient atmosphere forming by depositing an amorphous SiO_x in an oxygen ambient, col. 1, lines 27-40. Blumenfeld gives motivation in col. 1, lines 27-40. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Blumenfeld's process with Barbee's invention would have been beneficial because the hard layer is less sensitive to elevated temperature.

Claims 23, 24, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above, and further in view of Finely et al., U.S. Publication No. 2002/0009621.

Barbee does not specify forming a metallic layer, but Finely does. Finely teaches forming wherein said depositing comprises depositing a metallic layer and oxidizing said metallic layer, further comprising the step of oxidizing by at least one of the following parameters: thickness of the layer, temperature during oxidizing, and the atmosphere wherein said oxidizing is performed: oxidizing by controlling the atmosphere, p. 1, ¶ 4; further comprising the step of depositing said hard layer as an electrically conductive layer: inherently wherein all metals conduct, and hence metal oxides also conduct, if at a lower level of conductance.

Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbee as applied to claims 1, 3-7, 17, 19, 28, 30, 31 above.

Barbee does not specify the thickness of the hard layer leaving this dimension to be optimized by the practitioner.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentablility to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Allowable Subject Matter

Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed 30 August 2004 have been fully considered but they are not persuasive. Applicant argues that neither Barbee nor Joshi anticipate the independent claim wherein the surface of the first part is "adapted to be mechanically and electrically connected to a surface of a second part". Examiner disagrees. The surface of the first part is electrically and mechanically adapted to be connected to a second part, which forms the lower part of the structure (28 in Barbee and 102 in Joshi). It is reminded to applicant that while there may be obvious differences between the figures of the application and the prior art, the examiner is tasked with giving the claims the broadest interpretation reasonably acceptable.

Examiner must give claims their broadest reasonable interpretation, MPEP §2111, "During patent examination, the pending claims must be 'given the broadest reasonable interpretation consistent with the specification.' Applicant always has the opportunity to amend the claims during prosecution and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified, *In re Pratter*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51

(CCPA 1969), *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997)." Also see *In re Zletz*, 13 USPQ 2d. 1320 (Fed. Cir. 1989).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William M. Brewster

27 September 2004
WB